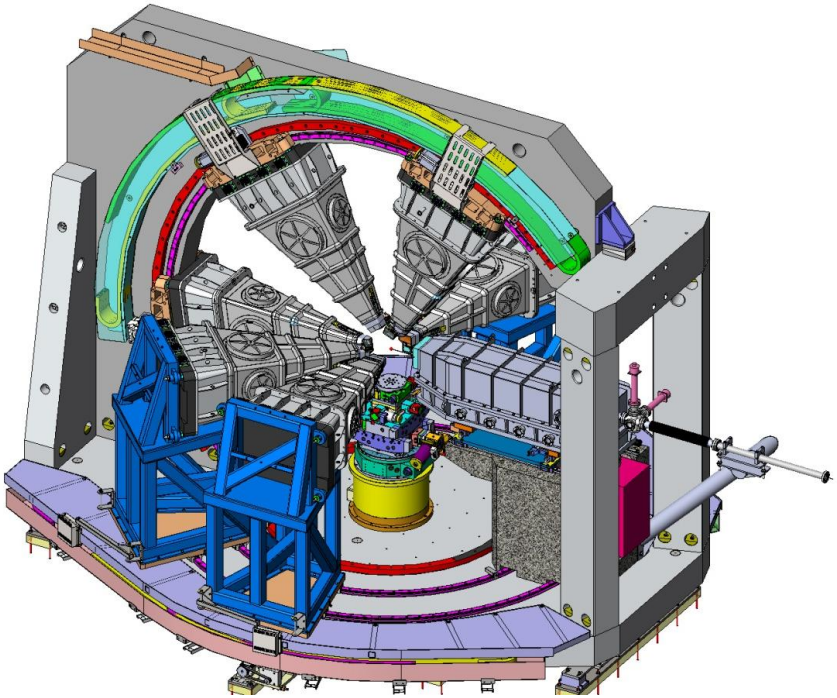
X-ray Raman



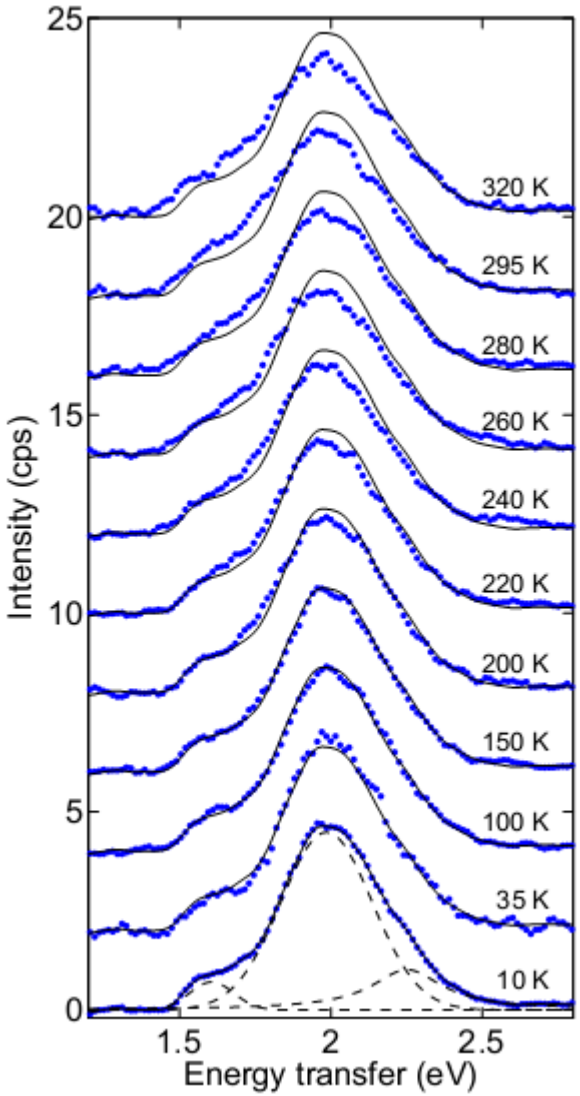
Advantages

- bulk sensitivity
- solids, but also liquids and gases
- *operando* conditions, high-pressure
- dipole, but also monopole, quadrupole, etc… (*l*-projected DOS)

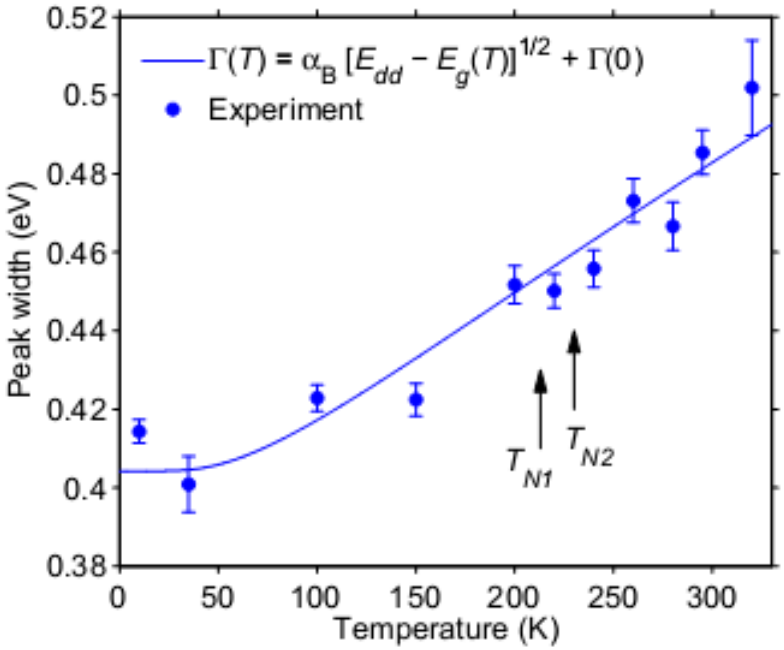
Disadvantages

- limited energy-resolution (DE~0.5 eV)
- low XRS cross-section (high incident photon flux, large “detector”, long exposures)

d-d excitations

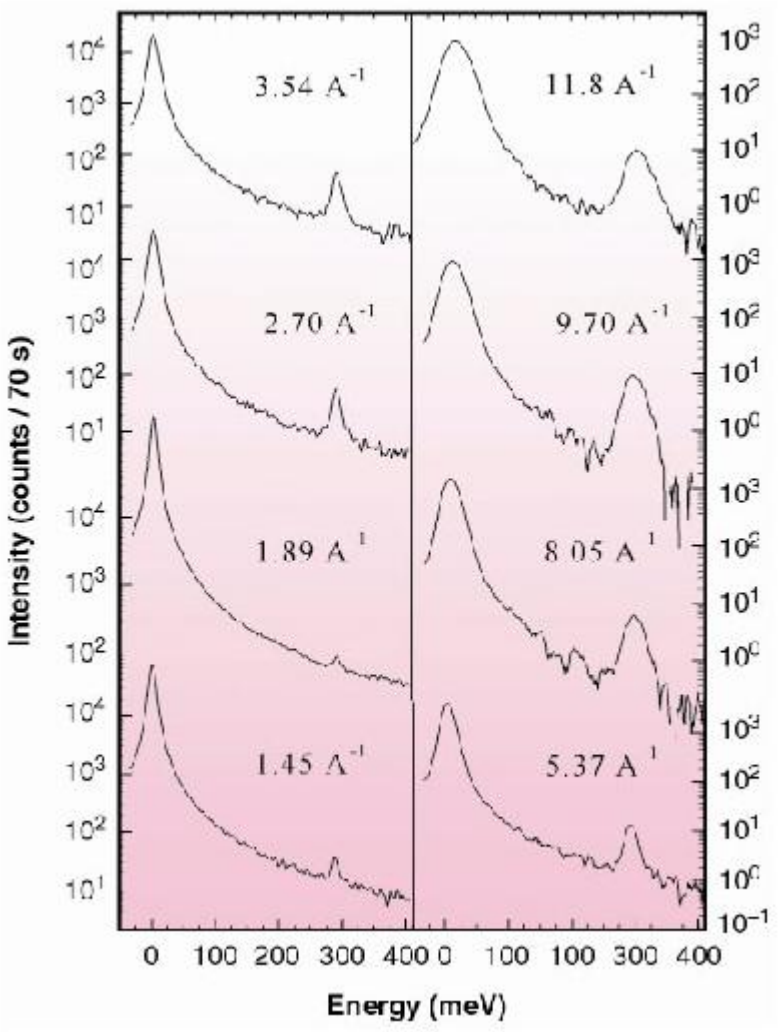


Huotari et al. JPCM 26, 165501 (14)

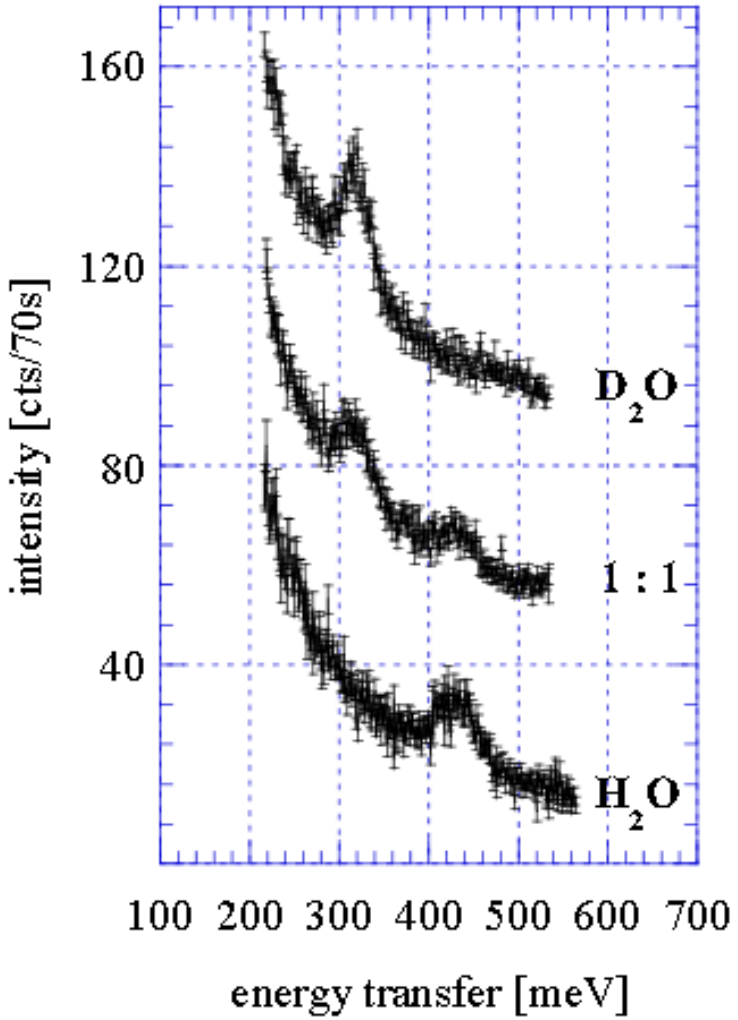


- Non-resonant IXS as bulk-sensitive and high-resolution spectroscopy complementary to optical absorption, EELS and RIXS
- A detailed theoretical framework has been formulated

Vibrational spectroscopy

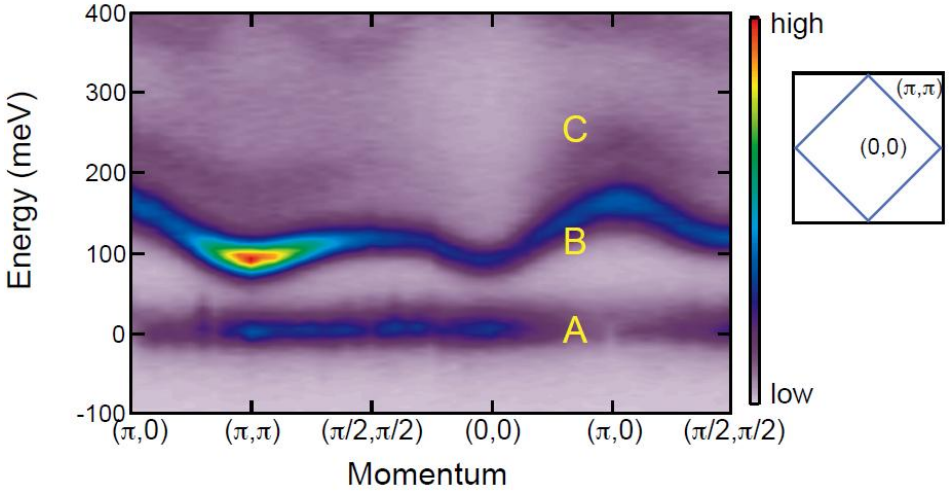


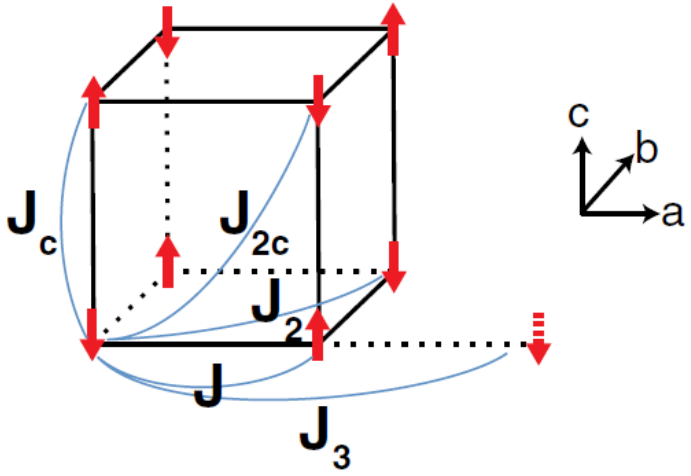
Monaco et al. PRB 64, 212102 (01)



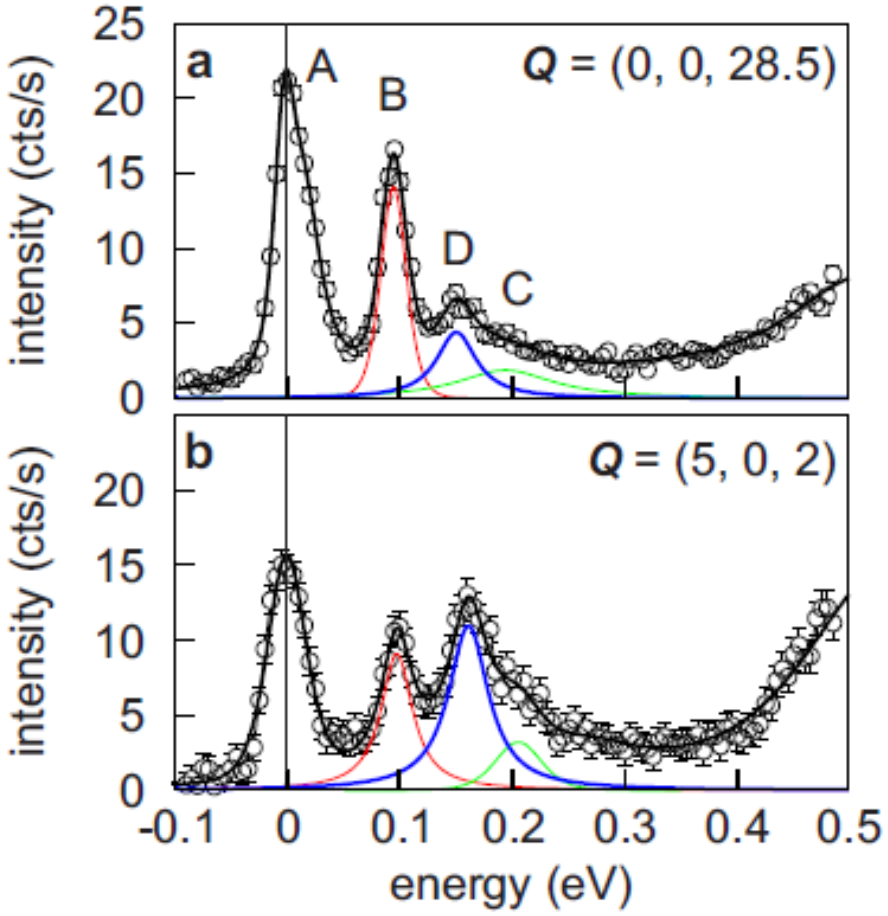
Halcoussis et al. ESRF Newsletter (00)

RIXS @ Ir L_3 edge: $Sr_3Ir_2O_7$





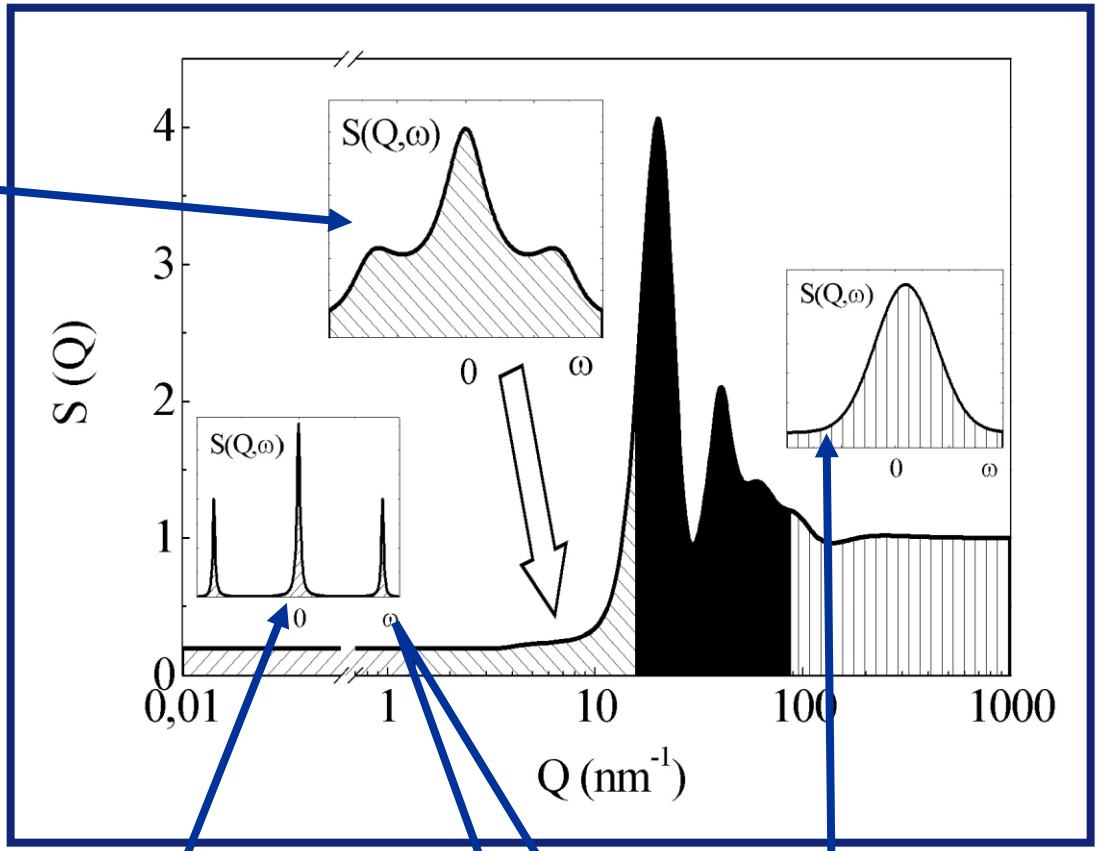
Kim *et al*., Phys. Rev. Lett. 109, 157404 (2012)



Moretti Sala *et al*., Phys. Rev. B 92, 024405 (2015)

Acoustic excitations in disordered systems - I

Microscopic regime
→ not complete understanding
→relaxation processes invoked to account for the spectral shape and the broadening of the excitations



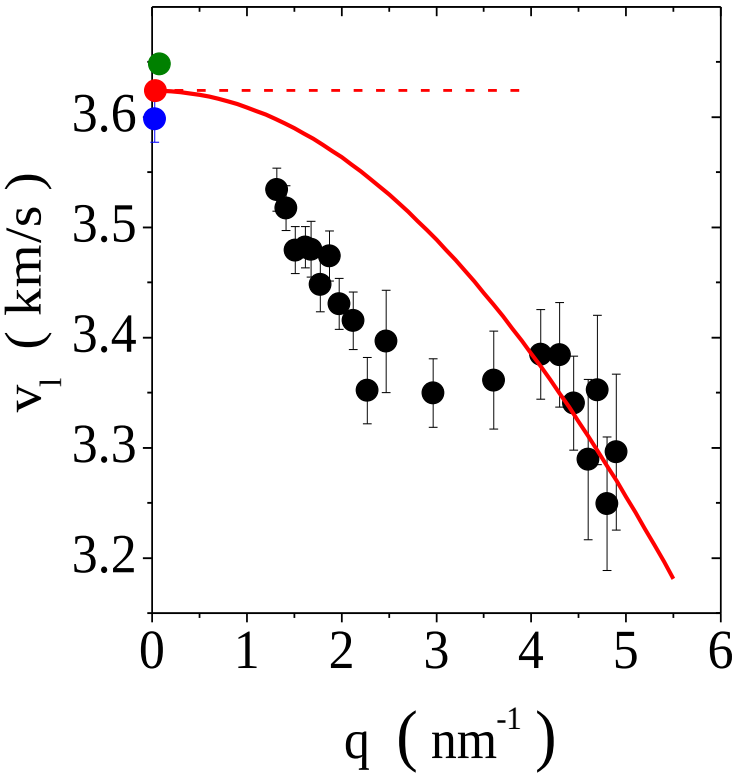
Macroscopic regime
→ hydrodynamics

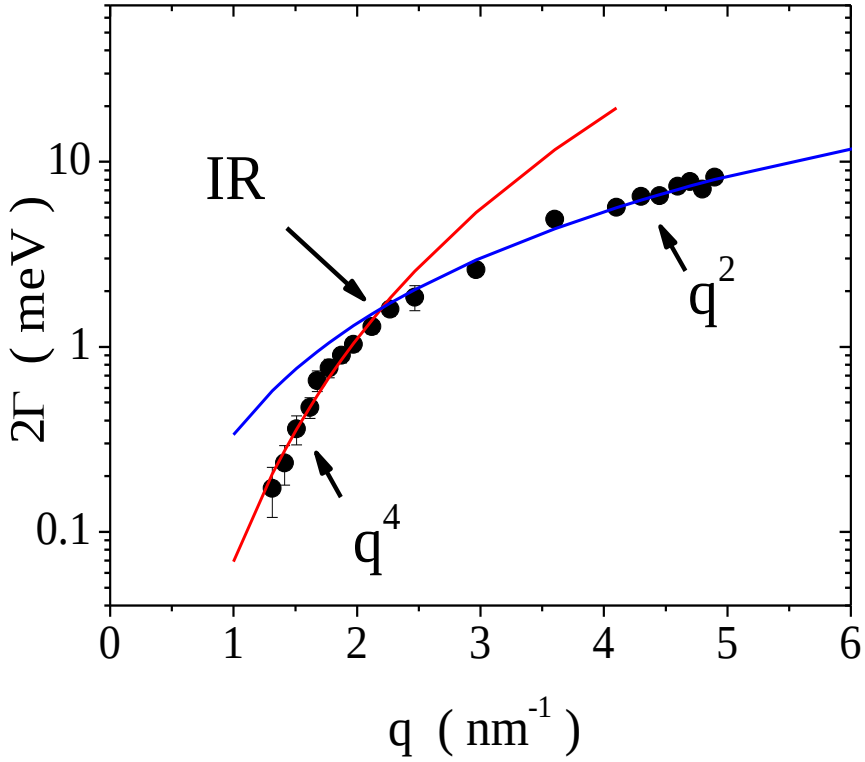
v=ħω/q

Free particle regime:
impulse approximation

Acoustic excitations in disordered systems - II

Breakdown of the Debye approximation & appearence of a Reyleigh scattering regime on the mesoscopic lengthscale of glasses





Monaco & Giordano, PNAS 106, 3659 (09)